

# SAFETY NEWS RELEASE

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## CHLOROFORM HAZARD

### Statement of Hazard

Exposure to chloroform by itself has the potential to cause detrimental health effects. However, a lesser known potential secondary hazard associated with chloroform usage carries an even greater threat. Chloroform may undergo autoxidation and produce Phosgene. Phosgene is a highly toxic and corrosive gas that with brief exposure can be fatal.

### Incident Summary

Researchers at the University of California, Los Angeles were using a 3-year-old bottle of chloroform. They noticed that the people working with the chloroform were becoming quite ill. Subsequent analysis showed concentrations of 15,000 ppm of phosgene in the head space of the bottle and a 1.1% concentration of phosgene in the bulk solution. Exposure to 20 ppm for 1-2 minutes can cause severe lung injury and 570 ppm for one minute can cause death. The chloroform was stored properly and was stabilized with amylene. (Note: chloroform comes in three basic varieties: No stabilizer present; Stabilized with amylene; and Stabilized with an alcohol such as ethanol.)

A search of the literature has shown that the generation of phosgene from chloroform was a well-known phenomenon 50-100 years ago when chloroform was used as an anaesthetic. Evidently, the generation of phosgene from chloroform has since been forgotten since there are no warnings on material safety data sheets for chloroform, including chloroform that has not been stabilized.

### Recommended Precautions to Prevent Exposure to Chemicals

All exposures to chemicals should be minimized as much as possible. In the case of chloroform, it is an irritant, a narcotic, a hepatotoxin, a nephrotoxin and a suspect carcinogen. The permissible exposure limit for chloroform is 2 ppm. However, the odor threshold is 200 ppm for most people. If you can smell chloroform when you are using it, there is a good chance you are being overexposed.

The following precautions should be taken to avoid inhalation of chloroform and other chemicals.

1. NEVER perform a "sniff" test on a chemical or compound.
2. Always work with a chemical or compound in a chemical fume hood.
3. Always utilize appropriate personal protective equipment.

### Rules for Working with Chemical Fume Hoods

Following these general rules for working with chemical fume hoods will further enhance your prevention of exposure.

1. Only use chemical fume hoods that are working properly and have been inspected by the electric shop within the past year.
2. Keep chemicals and the procedures with chemicals at least 6 inches behind the hood sash.
3. Never put your head inside a fume hood to check an experiment.

4. Vertical opening hood sashes should be kept to the lowest possible position. For horizontal opening sashes, keep one of the doors positioned to act as a shield. And when the hood is not in use, keep the sashes closed, to maintain proper airflow.
  5. Keep hoods clean and uncluttered. If there is a slot in the back of the hood, make sure it does not become clogged with paper or dirt. Only allow materials actively being used to remain inside the hood. Support any equipment that must remain in the hood, on a platform or rack to provide adequate airflow within the hood.
  6. Report any suspected hood malfunctions promptly to Pete Petch, Industrial Hygienist or the electric shop and follow up to ensure that it is corrected.
- NOTE: Always clean hoods before maintenance personnel work on them.

#### **Additional Recommendations while using Chloroform**

1. Chloroform that is stabilized with alcohol should be purchased. Alcohol is usually added in greater concentrations than amylene so it provides better protection from phosgene generation. Also, there is evidence that amylene may not prevent phosgene generation.<sup>1</sup>
2. Chloroform should be treated as a time-sensitive chemical, and as such, dated upon receipt. This is especially true of chloroform that is either not stabilized or stabilized with amylene.<sup>1</sup>
3. Chloroform should always be stored in a dark place. In the presence of light, chloroform undergoes autoxidation to generate phosgene; this can be minimized by storing this substance in the dark under nitrogen. Commercial samples of chloroform frequently contain 0.5 to 1% ethanol as a stabilizer.<sup>2</sup>
4. Stock only what you can use in three months or less. Set up a "just-in-time" purchasing policy and purchase the smallest container size that is practical. Keep waste bottles tightly capped and stored in a ventilated storage cabinet or, at last resort, in a fume hood.
5. Peter Petch, Industrial Hygienist should be contacted before using chloroform more than six months old.
6. If possible, try to use a less hazardous substitute for chloroform.

#### *References:*

1. *Chemical & Engineering News*, March 2, 1998
2. *Prudent Practices in the Laboratory*, National Research Council, ed. 1995, p. 283, National Academy Press, Washington, D.C.

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